

MOTUS®

Uživatelský manuál



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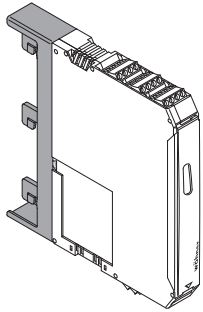
RU Инструкция по эксплуатации

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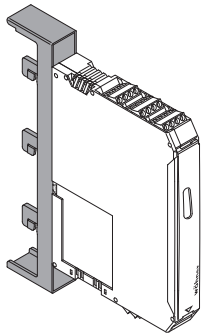
Ausführungsvarianten | Design variants | Différentes versions | Versioni | Versiones |



System 30Compact

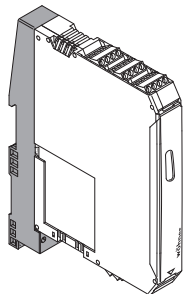
MOTUS®30Compact	0,075–0,6 A/ 0.075–0.6A	0,18–2,4 A/ 0.18–2.4A	1,5–9 A/ 1.5–9A
Artikelnummer / Order number / Référéncé / Codice articolo / Número de artículo / Арт. №	36 101	36 104	36 107

MOTUS®
Hybrid motor starter with reversing function.



System 60Classic

MOTUS®60Classic	0,075–0,6 A/ 0.075–0.6A	0,18–2,4 A/ 0.18–2.4A	1,5–9 A/ 1.5–9A
Artikelnummer / Order number / Référéncé / Codice articolo / Número de artículo / Арт. №	36 102	36 105	36 108

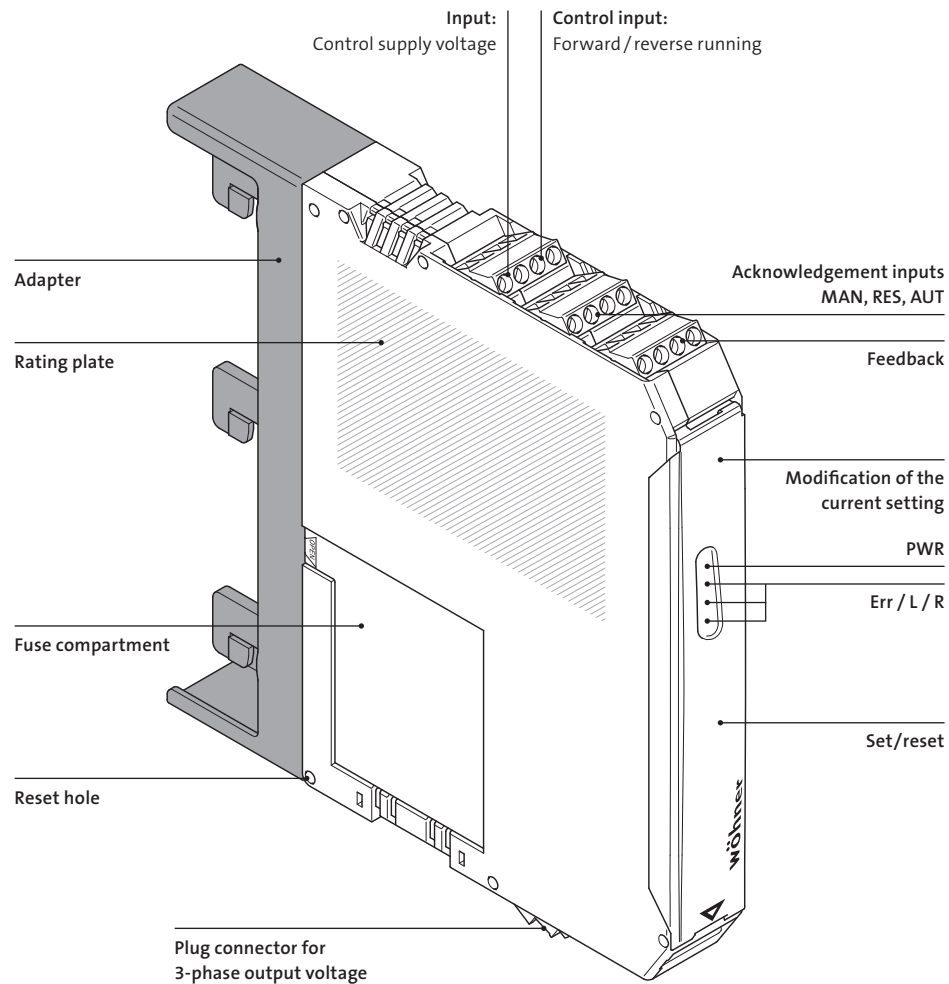


DIN-Tragschiene | DIN rail mounting | Montage sur rail DIN | Guida DIN | Carril DIN | Монтажную рейку

MOTUS®Panel	0,075–0,6 A/ 0.075–0.6A	0,18–2,4 A/ 0.18–2.4A	1,5–9 A/ 1.5–9A
Artikelnummer / Order number / Référéncé / Codice articolo / Número de artículo / Арт. №	36 100	36 103	36 106

MOTUS®

Overview.



1. Safety regulations / installation notes

- When working on the device, observe the national safety rules and regulations for the prevention of accidents.
- Disregarding these safety regulations may result in death, serious personal injury or damage to equipment.
- The device may only be started up, assembled, modified or retrofitted by an authorized electrician.
- Before working on the device, disconnect the power.
- For emergency stop applications, a machine must be prevented from restarting automatically by a higher-level control system!
- During operation, parts of electrical switching devices carry hazardous voltages.
- During operation, the protective covers must not be removed from the electric switchgear!
- Keep the instruction sheet in a safe place.
- The device is an associated item of equipment and must not be installed in potentially explosive areas. Adhere to the relevant safety regulations when setting up and operating the relevant equipment.
- The safety regulations applicable when motors are used in the Ex area must be complied with (ATEX directive 2014/34/EU).
- If the „Automatic RESET“ mode is used, the drive is switched on again after the cooling time has expired - if a control signal is still present. The cooling time is 20 minutes. For applications in the Ex-protection area, automatic restart is not permitted.
- The device may not be subjected to mechanical and thermal loads that exceed the thresholds specified in the operating manual. If required, the device should be installed in an appropriate housing with suitable protection (e.g. IP54) according to IEC 60529/EN 60529 to provide protection against mechanical and electrical damage. Where dusts are present, the device must be installed in a suitable housing (at least IP64) according to EN 61241.
- Installation should be carried out following the instructions provided in the operating instructions. The circuits inside the device must not be accessed during operation.
- The item cannot be repaired by the user and has to be replaced by an equivalent device. Repairs may only be carried out by the manufacturer.
- The safety data and features according to the EC-type examination certificate must be observed.
- The device carries out diagnostics on the functions when the drive is switched on or when it is switched off. In addition, an authorized electrician or a skilled worker who is well acquainted with the relevant standards can conduct the „Motor overload protection“ safety function test. For this test, the drive must be operated with right or left rotation (forward or reverse running), and the current flow in a conductor interrupted (e.g. by removing the fuse in the L1 or L3 phase). The hybrid motor starter then switches off the drive within 1.5 to 2s. The LEDs for right or left rotation (forward or reverse running) go out and the ERR-LED and the reply output are set.
- The device must be secured with the help of an access protection during safety-related applications.
- Only use power supply units with safe isolation and PELV in accordance with EN 50178/VDE 0160 (PELV). This prevents short circuits between primary and secondary sides.

Scope of use

- In circuits in potentially dust-explosive areas of zones 21 and 22, it must be guaranteed that the equipment connected to this circuit complies with category 2D or 3D or is certified as such.
- This is a product for environment A (industry). In environment B (household), this device can cause undesired radio interference; in such a case, the user may be under obligation to implement appropriate measures.
- MOTUS® has been developed for the operation of AC motors with sinusoidal, symmetrical load and for evenly distributed 3-phase ohmic loads. The hybrid motor starter has a reversing function, current monitoring and safety function. The internal locking circuit and load wiring reduce the amount of cable required.

The functions require a sinusoidal load. The MOTUS® must therefore not be used directly upstream or downstream of frequency inverters.

To ensure correct function, current must not be allowed to flow "past" the MOTUS® to the motor. No strong electrostatic backflow is allowed from the load side back to the MOTUS®. **Insulation faults or**

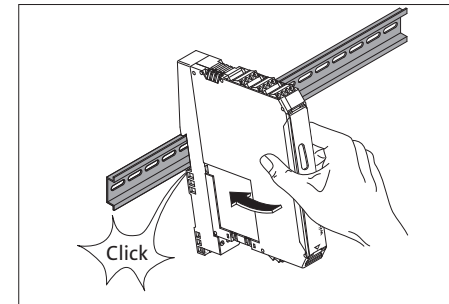
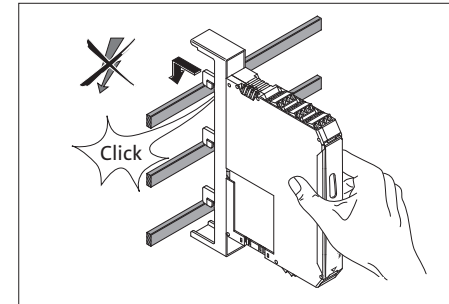
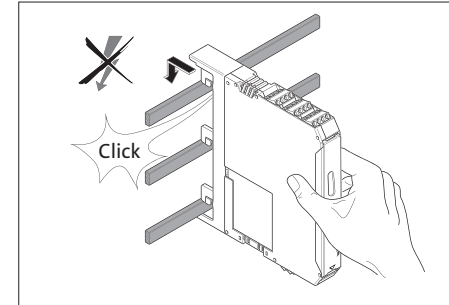
a connection of the motor coil to a potential that is not passed via the MOTUS® (e.g. neutral point with the neutral conductor) can generate a fault message that requires the device to be replaced for reasons of functional safety. This fault is registered permanently in the error memory.

2. Product table

Type MOTUS®ContactronControl, direct and reversing starters	Pack Qty	Weight kg/100 units	Order no
for System 30Compact for 12 × 5mm and 12 × 10mm busbars			
Type 0.075–0.6A	1	34.0	36 101
Type 0.18–2.4A	1	34.0	36 104
Type 1.5–9A	1	34.0	36 107
for System 60Classic for 12 × 5–30 × 10mm busbars, double-T and triple-T sections			
Type 0.075–0.6A	1	34.7	36 102
Type 0.18–2.4A	1	34.7	36 105
Type 1.5–9A	1	34.7	36 108
for DIN rail mounting according to DIN EN 60715			
Type 0.075–0.6A	1	34.9	36 100
Type 0.18–2.4A	1	34.9	36 103
Type 1.5–9A	1	34.9	36 106
Accessories			
Plug connector with cable connection, 2 devices	1	7.6	36 902
Plug connector with cable connection, 3 devices	1	8.3	36 903
Plug connector with cable connection, 4 devices	1	10.0	36 904
Spare components			
16A fuse for order no.: 36101, 36104, 36102, 36105, 36100 and 36103	3	0.9	31 567
20A fuse for order no.: 36107, 36108 and 36106	3	0.9	31 568
30A fuse for order no.: 36107, 36108 and 36106 for motors with heavy starting	3	0.9	31 569
Electronics module device 0.075–0.6A for direct and reversing starters	1	29.2	36 109
Electronics module device 0.18–2.4A for direct and reversing starters	1	29.2	36 110
Electronics module device 1.5–9A for direct and reversing starters	1	29.2	36 111
Adapter for System 30Compact	1	4.7	36 113
Adapter for System 60Classic	1	5.5	36 114
Adapter for DIN rail mounting	1	5.7	36 112

3. Mounting and connecting the main circuit

Snap the complete module including busbar or DIN rail adapter onto the rail.



In the case of the busbar variant, the electrical connection to the 3-phase network is established directly by means of the adapter. When using the DIN rail adapter, observe the terminal designations when connecting the 3-phase network.

CAUTION: Never carry out work when voltage is present! Danger to life!

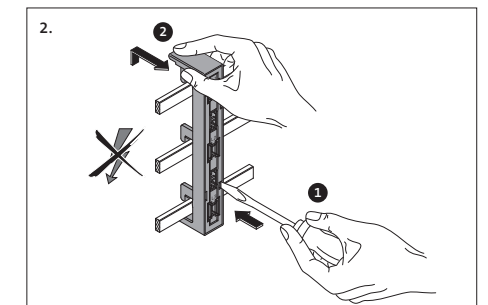
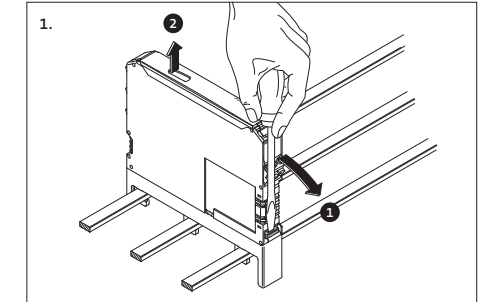
The following coordination types are achieved with the fuses used:

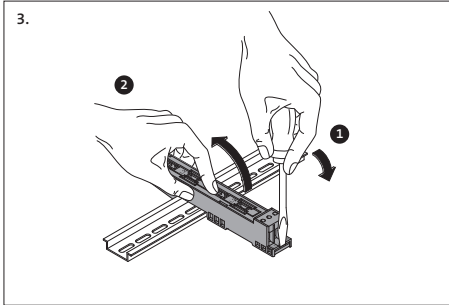
Coordination types	
0.6A and 2.4A variants	
16A (FUSE-10X38-16A-GR)	10kA, 500V, coordination types 2 device protection 50kA, 500V, coordination type 1 system protection
9A variants	
20A (FUSE-10X38-20A-GR)	5kA, 400V, coordination types 2 device protection 50kA, 500V, coordination type 1 system protection
30A (FUSE-ClassCC-30A-MR)	30kA, 500V, coordination type 1 system protection

Note: 30A fuse is only needed for motors with heavy starting.

Removal

To remove the busbar variants, the electronics component must first be removed from the busbar adapter.





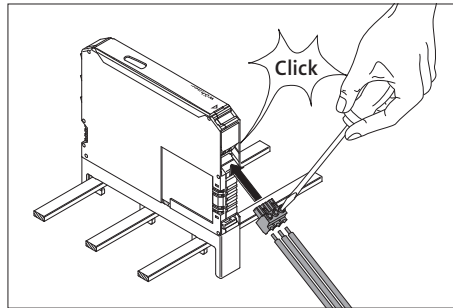
The 24V DC control supply voltage and control voltage inputs must be operated with power supply modules according to DIN 19240 (max. 5% residual ripple)!

In order to avoid inductive or capacitive coupling of noise emissions where long control wires are used, we recommend the use of shielded wires.

If you want to clamp two conductors under one terminal point, you must use conductors with the same conductor cross section!

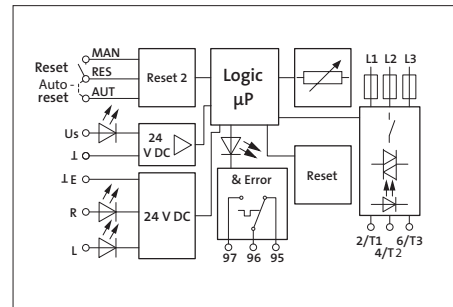
Connecting the motor output in the main circuit

The motor output is connected using a 3-pole plug connector (included in the scope of delivery).

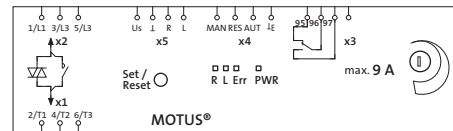


5. Functions

Block diagramm



EPLAN-symbol



Visualisation – Status-LEDs

The hybrid motor starter visualises the operating statuses with a total of four LEDs. The functions of the LEDs follow the NE 44 NAMUR recommendation.

- A green LED (PWR) indicates the general device status.
- Left or right rotation of the drive (reverse or forward running) is indicated by a yellow LED (L or R respectively).
- An internal or external error (process error: overcurrent, asymmetry, phase failure) is indicated by a red LED (ERR).

X5	U	I	R	L
X4	MAN	Res	AUT	IE
X3	95	96	97	

- After the control supply voltage is applied, all LEDs light up once, as an LED test.
- If an error is detected, the device is switched to the safe shutdown state.

Diagnostic function

Through various diagnostic functions, the hybrid motor starter can detect many internal errors and also external errors (I/O errors).

- All internal errors cannot be confirmed and are stored in the device. Afterwards the device cannot be started up.
- In case of external errors, an error acknowledgment is required to exit the safe shutdown state.

Status	LED description	PWR Green	Err Red	L Yellow	R Yellow	96 97	95 96	Error acknowledgement
OFF	No supply voltage (control supply voltage) present	A	A	A	A	0	1	–
Operational readiness	Supply voltage (control supply voltage) present	E	A	A	A	0	1	–
Drive switched on	• Reverse running (L) • Forward running (R)	E	A	E	A	0	1	
Internal error	Internal device error – Device replacement required	E	E	A	A	1	0	not possible
Internal error in controller or I/O devices (maintenance requirement, NE44)	Bimetal function: The motor current is higher than the nominal motor current specification (e.g. class 10A): Cooling time running! (20 minutes) Countdown of cooling period (20min) only starts							
	• Error in reverse running.	E	B	E	A	1	0	Automatic
	• Error in forward running.	E	B	A	E	1	0	Automatic
	After 2 minutes, the „L“ or „R“ flashes: A manual reset is possible.							
	• Error in reverse running.	E	B	B	A	1	0	Manual
	• Error in forward running.	E	B	A	B	1	0	Manual
	Error restoring the system state: Checksum erroneous. The thermal memory of the bimetal function is set to the max. value. The error must be manually acknowledged, also in automatic mode.	E	B	B	B	1	0	Manual
	Symmetry: The two motor currents deviate from each other by more than 33%.	E	B	A	A	1	0	Manual
	Phase failure: Phase failure with pending control voltage							
	• Error in reverse running (left rotation).	B	B	E	A	1	0	Automatic
	• Error in forward running (right rotation).	B	B	A	E	1	0	Automatic
	Possible causes: minimum current not achieved, below 0.06A (0.6A), 0.18A (2.4A), 1.2A (9A) fault in mains voltage, fuses have been triggered, motor line interrupted							
	Blocking: The max. measurable motor current is exceeded for more than 2s.							
	• Error in reverse running.	E	B	B	A	1	0	Manual
	• Error in forward running.	E	B	A	B	1	0	Manual

Explanation: A = LED switched off / E = LED permanently lit / B = LED flashes at a frequency of 2Hz (50:50)

Error acknowledgement

Three different options are available for error acknowledgement.

Manual (set/reset button)

Press the set/reset button on the front of the device.

If the set/reset button is still being pressed after approx. 2s, the hybrid motor starter adopts an error state again. If the acknowledgement request (actuated set/reset button) is active for more than 6s, an advanced test is conducted for the power output module and then a switch performed to the „Parameterization“ operating mode.

Manual (remote acknowledgement point)

Connect a button (N / O contact) between the MAN and RES terminals.

An acknowledgement is triggered as soon as a positive edge is detected at the MAN input - button pressed briefly. If a negative edge is not identified after approx. 2s, the hybrid motor starter adopts the error status again.

Automatic

Establish an electrical connection between the RES and AUT terminals.

After the bimetal monitoring has been triggered and the subsequent cooling, the device performs an automatic acknowledgement.

The RES terminal provides the voltage for the reset.

In variants with a rated control supply voltage of 24V DC, this is 24V DC.

Feedback

As soon as the hybrid motor starter detects an error, the reply relay is switched, i.e. the N / O contact is closed or the N / C contact is opened. This behavior corresponds to that of a motor overload protection relay.

The feedback is for signaling purposes only and is not part of the safety chain. It is thus not included in the safety monitoring.

Parameterization – Nominal current setting

Note: This function is only possible if the device is not activated and there is no defect at the device.

1. Make sure that the 24V DC control voltage is applied, no R or L activation is taking place and that no error message is displayed.

2. Open the cover.

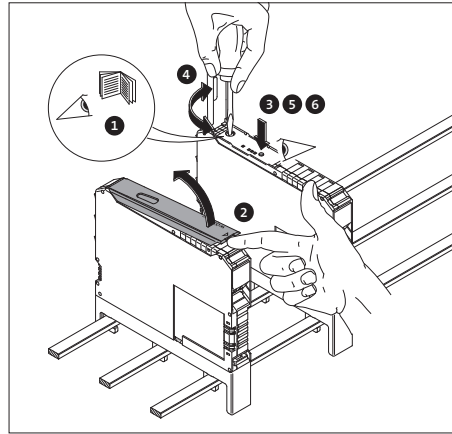
3. Press the set/reset button for more than 6s to change to the „Parameterization“ mode – the green PWR LED flashes once.

Note: In Parameterization mode, the LEDs are switched off every 2s for 0.3s to distinguish this mode from other operating modes.

4. Set the nominal current of the drive using the 240° potentiometer. The nominal current is specified in 16 stages. The four LEDs show the set current.

5. Store this value by pressing the set / reset button again (non-volatile area of the data memory).

6. Press the set / reset button for more than 2s (and less than 6s) to display the set current for 3s.



Code				Nominal current (mA)		
PWR	ERR	L	R	0.6A	2A	9A
0	0	0	0	75	180	1500
0	0	0	1	110	250	2000
0	0	1	0	145	410	2500
0	0	1	1	180	560	3000
0	1	0	0	215	710	3500
0	1	0	1	250	870	4000
0	1	1	0	285	1020	4500
0	1	1	1	320	1170	5000
1	0	0	0	355	1330	5500
1	0	0	1	390	1480	6000
1	0	1	0	425	1630	6500
1	0	1	1	460	1790	7000
1	1	0	0	495	1940	7500
1	1	0	1	530	2090	8000
1	1	1	0	565	2250	8500
1	1	1	1	600	2400	9000

Note: If the motor current is above 45A, the block monitoring is activated (see 9. Trigger characteristic curve and derating curve).

6. Application examples

Safety door (EMERGENCY STOP)

In applications where the safety switch-off is a normal operating mode, such as in the case of safety door or two-hand applications, a circuit as per Fig. 4 should be used. Here, the control circuit is switched off via a safety relay as soon as the EMERGENCY STOP button is

actuated. If the switch-off is performed, for instance, from a „safe controller“ with semiconductor outputs, the residual voltage must be < 5V DC. Interruptions ≤ 3 ms are filtered.

EMERGENCY STOP

Integrating a hybrid motor starter into an EMERGENCY STOP chain is pictured in Fig. 5.

In this application, the control circuit is switched and not the control supply voltage.

If the switch-off is performed, for instance, from a „safe controller“ with semiconductor outputs, the re-

sidual voltage must be < 5V DC. Interruptions ≤ 3 ms are filtered.

Note: Switching off the control voltage supply with a controlled motor always results in wear in the hybrid motor starter! This switch should only be used if no more than 10,000 shutdowns can be expected over the entire lifespan of the system. If the switch-off is performed, for instance, from a „safe controller“ with semiconductor outputs, the residual voltage must be < 5V DC. Interruptions ≤ 1ms are filtered.

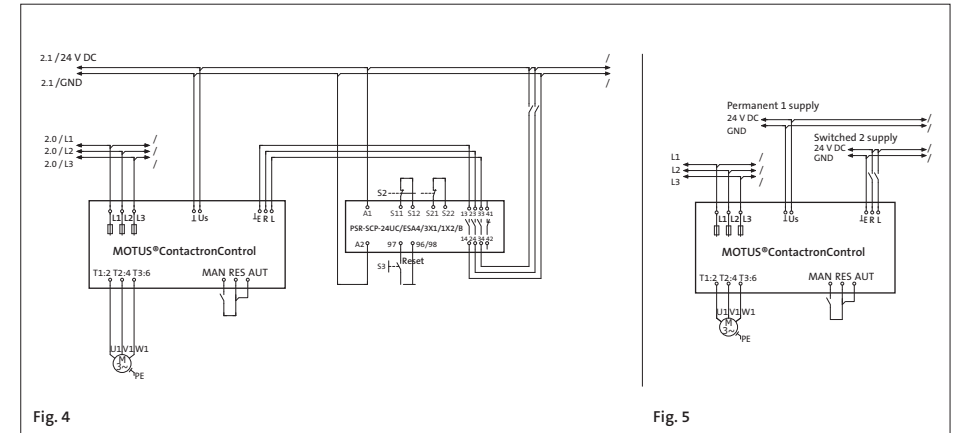


Fig. 4

Fig. 5

Motor overload protection

All safety-relevant functions are implemented by the hybrid motor starter, without external influences. Special circuit technology is not necessary.

Wiring of the load current circuit should be realized as described in the examples provided. The module current supply can however be directly connected to the voltage source, without the PSR safety relay. The same is applicable for the control.

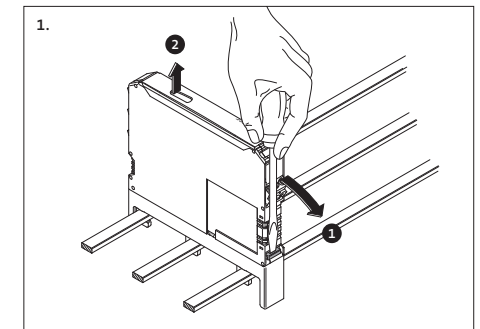
Motor with brake

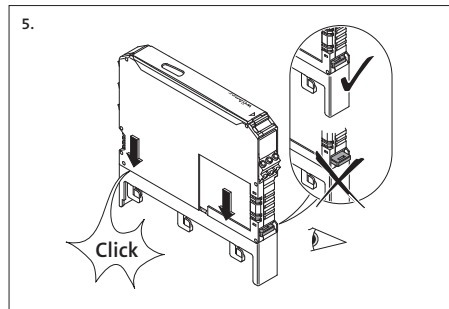
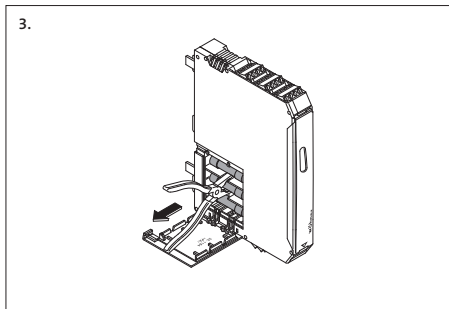
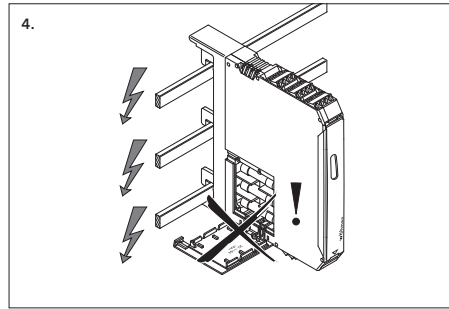
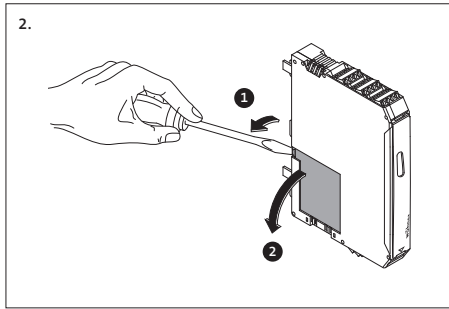
If a motor with brake is connected (in the motor terminal board), the 400V AC brake has to be connected to the 2 / T1 and 6 / T3 connections. A 230V AC brake must be connected with 4 / T2 and the neutral point of the motor.

Note: The motor current monitoring must be increased by the value of the brake (nominal brake current).

Replacing fuses

The fuses are rated so that they only need to be replaced after damage. Mains outages or disconnection of fuses will be signaled as a phase failure upon activation (PWR + Err flash and L or R light up).





Spare fuses	
0.6A and 2.4A variants	
16A 31 567	Wöhner
16A 2903126	Phoenix Contact
16A FR10GR69V 16	Mersen

Spare fuses	
9A variants	
20A 31 568	Wöhner
20A 2903384	Phoenix Contact
20A FR10GR69V 20	Mersen

30A 31 569*	Wöhner
30A 2903119*	Phoenix Contact
30A CCMR30*	Littelfuse

* Is needed for motors with heavy starting.

Note: The listed fuses provide optimum short circuit protection and reliable control of the motor starting currents. We recommend that you only use these fuse types.

7. Technical data

Variants	Max. 0.6A	Max. 2.4A	Max. 9A
Input data			
Rated control supply voltage U_c , as per IEC 60947-1 / UL 508	24V DC		
Control supply voltage range	19.2–30V DC (32V DC, max. 1 min.)		
Control supply voltage, Switching level „Safe off“	< 5V DC		
Rated control supply current as per IEC 60947-1	≤ 40mA		
Control input L, R:			
Switching level „Low“	-3 to 9.6V DC		
Switching level „Safe off“	< 5V DC		
Switching level „High“	19.2–30V DC		
Input current	≤ 3mA		

Variants	Max. 0.6A	Max. 2.4A	Max. 9A
Output data			
Switching principle	Safety output module with bypass, three-phase electrically isolated shutdown		
Rated operating voltage U_n , as per IEC 60947-1	500V AC (50 / 60Hz)		
Operating voltage range as per IEC 60947-1	42–500V AC symmetrical		
Operating voltage range as per UL 508			
Load current at 20°C (see chapter 9)	0.075–0.6A	0.18–2.4A	1.2–9A
Rated operating current I_n , as per IEC 60947-1			
AC-51 as per IEC 60947-4-3	0.6A	2.4A	9A
AC-53a as per IEC 60947-4-2	0.6A	2.4A	6.5A
as per UL 508 (see chapter 9)	0.6A	2.4A	6.5A
Normal switching power as per UL 508			
Full Load (power factor = 0.4)	0.3kW (0.4HP)	0.9kW (1.2HP)	2.3kW (3.0HP)
Full Load (power factor = 0.8)	0.5kW (0.6HP)	1.7kW (2.2HP)	4.6kW (6.1HP)
Leakage current (input, output)	0mA		
Residual voltage at I_n	< 300mV	< 400mV	< 500mV
Surge current	100A (t = 10ms)		
Input protective circuit	Varistors, fuses		
Short circuit current rating SCCR as per UL 508a (under preparation)	With fuse class J (30A), suitable for use in circuits, that do not supply more than 100kA _{eff} symmetrical current, max. 500V		
Reply output			
Contact type	Single contact, 1PDT contact		
Contact material, in new condition	Ag alloy, hard gold-plated		
When used as	Signal contact	Power contact	
Max. switching voltage	30V AC / 36V DC	250V AC / DC	
Min. switching voltage	100mV	12V AC / DC	
Max. continuous load current I_o	50mA	6A	
Min. switching current	1mA	10mA	
Max. interrupting rating*, ohmic load 24V DC / 250V AC	1.2W / –	140W / 1500VA	
Measurement technology in ref. to 9. Trigger characteristic curve			
Two-phase current measurement, Range	0.07–0.6A	0.18–2.4A	1.5–9A
Symmetry monitoring			
Amount $I_{max} > I_{nenn} \Rightarrow (I_{max} - I_{min} / I_{max})$	≥ 33% / ≥ 67%	≥ 33% / ≥ 67%	≥ 33% / ≥ 67%
Amount $I_{max} < I_{nenn} \Rightarrow (I_{max} - I_{min} / I_{nenn})$	≥ 33% / ≥ 67%	≥ 33% / ≥ 67%	≥ 33% / ≥ 67%
Response time	2min. / 1.8s		
Phase failure monitoring, I (L1), I (L3) typ.	> 75mA	> 150mA	> 1200mA
Amount (angle (L1, L3))	170–190		
Response time	< 1.8s		
Blocking protection, I (L1) oder I (L3)	–	–	> 45A
Response time	–	–	2s
Trigger characteristic (see chapter 9) as per IEC 60947	Class 10A		
Cooling-down time	20min.		
Operating elements			
Operating voltage indicator	LED PWR (green)		
Device and process error display	LED Err (red)		
Activation display	LED L (yellow) / LED R (yellow)		
Button	Error acknowledgement		
Potentiometer for nominal motor current setting	240°		

* Other available on request.

Variants	Max. 0.6A	Max. 2.4A	Max. 9A
General data			
Power dissipation min./max.	0.88W / 2.8W	0.88W / 5.5W	0.88W / 12W
Max. switching frequency (pulse / pause times 50:50)	2Hz		
Deactivation time via control supply voltage	type 25ms max. 500ms		
Deactivation time via activation voltage	type 30ms max. 80ms		
Activation time via activation voltage	type 40ms max. 50ms		
Rated surge voltage between control input, control supply and switching voltage	6kV		
Nominal mains voltage (\leq 500V AC)	Safe isolation (EN 50178)		
Nominal mains voltage (\leq 300V AC), e.g. 230 / 400V AC, 277 / 480V AC	Safe isolation (IEC 60947-1)		
Nominal mains voltage (\leq 300–500V AC)	Basic isolation (IEC 60947-1)		
Control input, control supply voltage and reply output, reply output and switching voltage	Safe isolation (IEC 60947-1)		
Nominal mains voltage (\leq 500V AC)	Safe isolation (EN 50178)		
Nominal mains voltage (\leq 300V AC), e.g. 230 / 400V AC, 277 / 480V AC	Safe isolation (IEC 60947-1)		
Nominal mains voltage (\leq 300–500V AC)	Basic isolation (IEC 60947-1)		
Ambient temperature range operation	–25°C – +70°C		
Ambient temperature range transport, storage	–40°C – +80°C		
Surge voltage category	III		
Pollution degree	2		
Standards/specifications	IEC 60947-4-2 / IEC 61508-1 / ISO 13849-1/EN 954-1		
Power station requirement	DWR 1300 / ZXX01/DD/7080.8d		
Service life	3×10^7 cycles		
Degree of protection	IP20		
Mounting position	Vertical (horizontal DIN rail / busbar)		
Mounting (see 9. Derating curve)	Can be mounted in rows with zero spacing or with \geq 20mm spacing		
Housing:			
Material	PA 6.6		
Dimensions incl. DIN rail adapter	(22,5 / 175 / 138)mm (W/H/D)		
Dimensions incl. power busbar adapter 30Compact	(22,5 / 160 / 156)mm (W/H/D)		
Dimensions incl. power busbar adapter 60Classic	(22,5 / 200 / 156)mm (W/H/D)		
Connection data (conductor cross-section)	See connection notes (page 22)		
Screw terminal blocks (solid / stranded)	0.14–2.5mm ²	AWG 26–14	
M3 thread, recommended torque	0.5–0.6Nm	4.4–5.3 lb-in	
Adapter connection data			
Connection \varnothing DIN rail adapter (solid / stranded)	0.2–6mm ² / 0.2–4mm ² (AWG 24–10)		
Copper \varnothing Compact / Classic power busbar	5 (or 10) \times 12mm / 5 (or 10) \times 30mm		
Max. power busbar current	2500A		
Weight			
DIN rail adapter	Approx. 368g		
6Power busbar adapter 30Compact	Approx. 374g		
Power busbar adapter 60Classic	Approx. 377g		
Certification	EX II (2) G [Exe] [Exd] [ExpX]		EX II (2) D [Ext] [Exp]
EC type examination certificate to ATEX	PTB 13 ATEX 3001		
Safety level	See section 8.1 and 8.2		



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8. Sicherheitstechnische Funktionen | Safety functions | Fonctions de sécurité | Funzioni di sicurezza | Funciones técnicas de seguridad | Данные по технике безопасности

Systembedingungen | System conditions | Conditions du système | Condizioni del sistema |
Condiciones del sistema | Требования к системе

Datenbank für Ausfallraten / Database for failure rates / Base de données pour taux de défaillance / Banca dati per frequenze di guasto / Banco de datos para rangos de fallo / База данных по частоте отказов	SN 29500
Systemtyp (bestehend aus Subsystemen) / System type (consisting of subsystems) / Type système (composé à partir de sous-systèmes) / Tipo di sistema (composto da sottosistemi) / Tipo de sistema (compuesto de siste-mas subordinados) / Тип системы (состоящий из подсистем)	B
Angewandte Norm / Standard used / Norme appliquée / Norma applicata / Norma empleada / Применяемый стандарт	IEC 61508 / CEI 61508
Beta-Faktor / Beta factor / Facteur Bêta / Fattore Beta / Factor beta / Бета-фактор	1%
MTTF Mean time to failure [Jahre / years / années / anni / años / лет] Bei Umgebungstemperatur 40 °C / at an ambient temperature 40 °C / pour une température ambiante de 40 °C / a temperatura ambiente 40 °C / para temperatura ambiente de 40 °C / при температуре окружающей среды 40 °C	39,3

Sicheres Abschalten | Safe switch-off | Coupure de sécurité | Spegnimento sicuro |
Desconexión segura | Безопасное отключение

Umgebungstemperatur / Ambient temperature / Température ambiante / Temperatura ambiente / Temperatura ambiente / Температура окружающей среды	40 °C
MTTFd Mean time to failure [Jahre / years / années / anni / años / лет]	517
Abschaltzeit [ms] / Switch-off time / Temps de coupure / Tempo di disinserzione / Tiempo de desconexión / Время на отключение	80
Asd [FIT] safe, detectable / надежное, определяемое	664
Asu [FIT] safe, undetectable / надежное, неопределяемое	968
Add [FIT] dangerous, detectable / опасное, определяемое	218
Adu [FIT] dangerous, undetectable / опасное, неопределяемое	2,67
SFF [%] Safe Failure Fraction / доля безопасных сбоев	99,9
DCS [%] Diagnostic coverage safe / диагностическое покрытие для безопасных сбоев	40,7
DC [%] Diagnostic coverage / диагностическое покрытие сбоев	99
PFH Probability of a dangerous failure per hour / вероятность опасного отказа за час	$2,67 \times 10^{-9}$
Sicherheitslevel gemäß / Safety level as per / Niveau de sécurité selon / Livello di sicurezza secondo / Nivel de seguridad según / Уровень безопасности согласно	IEC/CEI 61508-1: SIL 3 ISO 13849-1: Kat. 3PLe EN 954-1 Kat.3

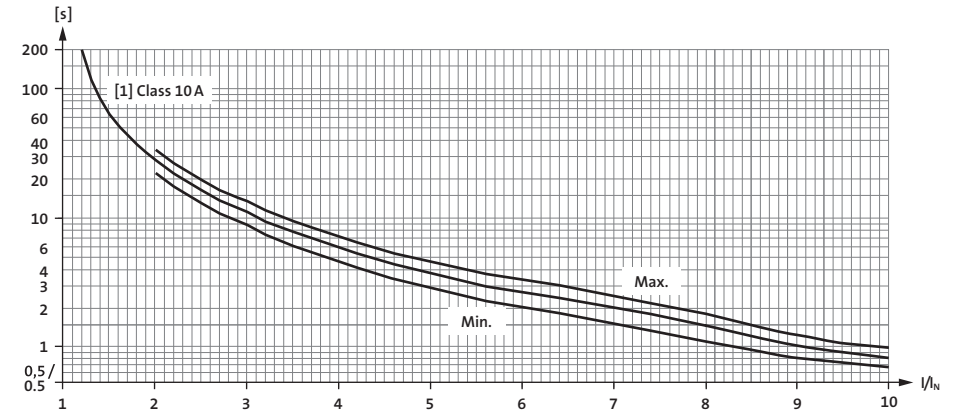
Motorschutz | Motor overload protection | Protection moteur | Protezione termica |
Protección del motor | Защита электродвигателя

Umgebungstemperatur / Ambient temperature / Température ambiante / Temperatura ambiente / Temperatura ambiente / Температура окружающей среды	40 °C
MTTFd Mean time to failure [Jahre / years / années / anni / años / лет]	447
Abschaltzeit [ms] / Switch-off time / Temps de coupure / Tempo di disinserzione / Tiempo de desconexión / Время на отключение	Class 10A, IEC / CEI 60947
Asd [FIT] safe, detectable / надежное, определяемое	637
Asu [FIT] safe, undetectable / надежное, неопределяемое	870
Add [FIT] dangerous, detectable / опасное, определяемое	239

Adu [FIT] dangerous, undetectable / опасное, неопределяемое	17
SFF [%] Safe Failure Fraction / доля безопасных сбоев	99
DCS [%] Diagnostic coverage safe / диагностическое покрытие для безопасных сбоев	42,3
DC [%] Diagnostic coverage / диагностическое покрытие сбоев	93,3
Sicherheitslevel gemäß / Safety level as per / Niveau de sécurité selon / Livello di sicurezza secondo / Nivel de seguridad según / Уровень безопасности согласно	IEC/CEI 61508-1: SIL 2

9. Anhang | Appendix | Annexe | Appendice | Apéndice | Приложение

Auslösekennlinie bei 20 °C | Trigger characteristic curve at 20 °C | Courbe de déclenchement à 20 °C | Curva di intervento a 20 °C | Curva característica de disparo para 20 °C | Характеристики срабатывания при 20 °C

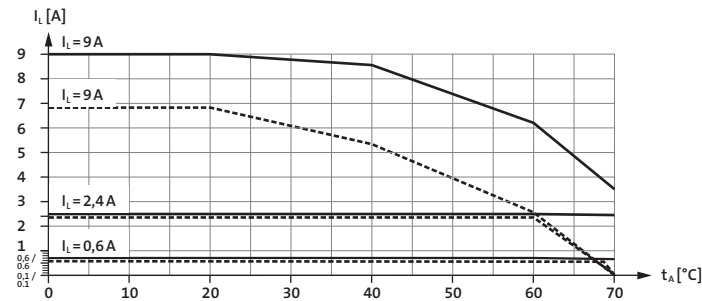


[s] Auslösezeit / Release time / Temps de déclenchement / Tempo di intervento / Tiempo de disparo / Время срабатывания при I/I_N Überstromfaktor (Das Verhältnis zwischen dem tatsächlichen Strom und dem parametrisierten Nennstrom) / Overcurrent factor (The ratio between the actual current and the parameterized nominal current) / Facteur de surcharge (Le rapport existant entre l'intensité effective et l'intensité nominale paramétrée) / Fattore di sovracorrente (rapporto tra la corrente effettiva e la corrente nominale impostata) / Factor de sobrecorriente (Relación entre la corriente real y la corriente nominal parametrizada) / Кратность термической устойчивости (Соотношение между фактическим током и параметрированным номинальным током)

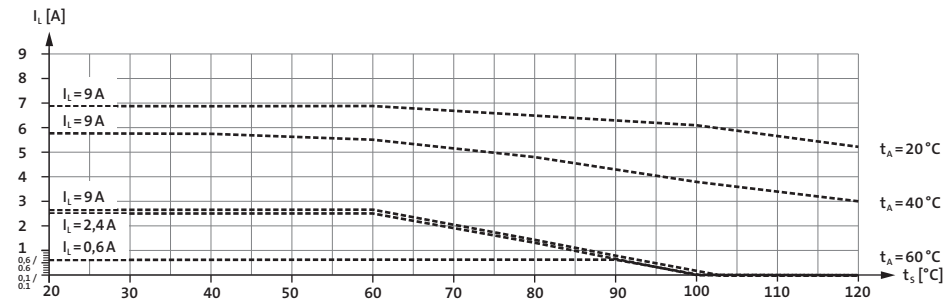
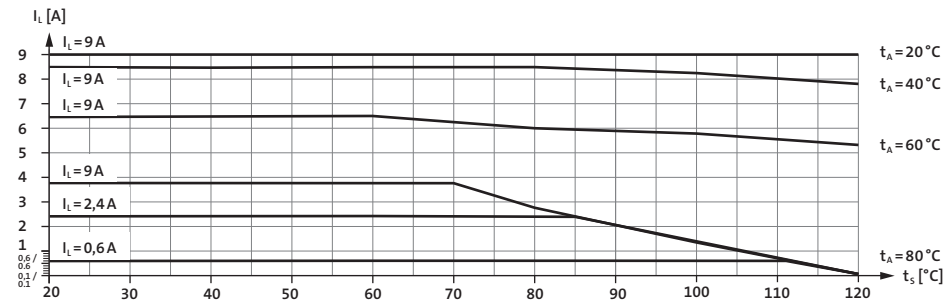
Deratingkurven bei 100% Einschaltdauer | Derating curves for 100 % operating time |
Courbes de déclassement à 100 % de la durée d'enclenchement | Curve di derating con
carico permanente al 100 % (ulteriori dati su richiesta) | Curvas derating para duración
de conexión del 100 % | Кривые изменения характеристик при 100 %-ной
продолжительности включения

In den Deratingkurven sind alle zugelassenen Sicherungen (s. Kapitel 6.) berücksichtigt / All permitted fuses (see chapter 6) are taken into account in the derating curves / Les courbes de déclassement prennent en compte tous les fusibles homologués (voir le chapitre 6) / Nelle curve di derating sono considerati tutti i fusibili ammessi (ved. Capitolo 6) / En las curvas derating se han tenido en cuenta todos los fusibles autorizados (véase el capítulo 6) / На кривых изменений характеристик учтены все допущенные к эксплуатации предохранители (см. главу 6).

Ausführung DIN-Tragschiene | DIN mounting rail type | Version pour rail DIN | Versione per guida DIN | Modelo para carril DIN | Исполнение для общей токопроводящей шины



Ausführung Sammelschienensystem | Busbar system type | Version pour jeu de barres | Versione per sistema barre | Modelo para sistema de barra colectora | Общая токопроводящая шина



■ Angereiht mit Abstand von 20 mm / Mounted in rows at a distance of 20mm / Montés avec un espacement de 20mm / affiancati con distanza di 20mm / Instalado con separación de 20mm / Установка в ряд с промежутком 20мм

■■■■ Angereiht ohne Abstand / Mounted in rows with zero spacing / Jointifs, sans espace / Affiancati senza distanza / instalado junto a otro sin separación / Установка в ряд без промежутков

I_L Laststrom / Load current / Courant d'emploi / Corrente carico / Corriente de carga / Ток нагрузки

t_A Umgebungstemperatur / Ambient temperature / Température ambiante / Temperatura ambiente / Температура окружающей среды

t_s Temperatur Sammelschiene / Busbar temperature / Température jeu de barres / Temperatura barra / Temperatura de la barra colectora / Температура шины

I_A = Anlaufstrom | Starting current | Courant de démarrage | Corrente di avviamento
 Corriente de arranque | Пусковой ток
 I_N = Bemessungsstrom | Rated current | Courant de référence | Corrente nominale
 Corriente asignada | Расчетный ток

9 A Deratingkurve / 9 A derating curve / Courbe de derating 9 A / 9 A Curva di derating / 9 A curva derating / 9 A Кривая изменения характеристик										
Gebrauchskategorie / Utilization category / Catégorie d'emploi / Categoria di impiego / Categoria de uso / Категория использования	AC-51							AC-53a		
Überstromfaktor I_A/I_N / Overcurrent factor I_A/I_N / Facteur de surintensité de démarrage I_A/I_N / Fattore di sovracorrente I_A/I_N / Factor de sobrecorrente I_A/I_N / Кратность термической устойчивости I_A/I_N	1	2	3	4	5	6	7	8	9	10
Anpassungsfaktor K / Adaption factor K / Facteur d'adaptation K / Fattore di adeguamento K / Factor de adaptació K / Коэффициент адаптации K	1	1	1	1	1	0,96	0,83	0,72	0,64	0,58

Beispiel 1 / Example 1 / Exemple 1 / Esempio 1 / Ejemplo 1 / Пример 1	
Motor mit Überstromfaktor (aus Motordatenblatt) / Overcurrent factor (from motor data sheet) / Moteur à facteur de surintensité de démarrage (de fiche technique du moteur) / Motore con fattore di sovracorrente (dalla scheda tecnica del motore) / Motor con factor de sobrecorrente (de la hoja de características del motor) / Кратность термической устойчивости (из технического паспорта на	$I_A/I_N = 8$
Anpassungsfaktor / Adaption factor / Facteur d'adaptation / Fattore di adeguamento / Factor de adaptació / Коэффициент адаптации	$K = 0,72$
Max. zulässiger Laststrom bei 30 °C, nicht angereiht / Max. permissible load current at 30 °C, not mounted in rows / Courant de charge maxi. à 30 °C, montage non jointif / Max. corrente di carico ammissibile a 30 °C (non in serie) / Corriente de carga máx. admisible a 30 °C, no alineado / Макс. допустимый ток нагрузки при 30 °C, не в ряд	$I_L = 9 A$
Max. zulässiger Bemessungsstrom / Max. permissible rated current / Courant d'emploi admissible maxi. / Max. corriente nominale ammissibile / Corriente asignada máx. admisible / Макс. допустимый расчетный ток	$I_N = 6,5 A$

Beispiel 2 / Example 2 / Exemple 2 / Esempio 2 / Ejemplo 2 / Пример 2	
Motor mit Überstromfaktor (aus Motordatenblatt) / Overcurrent factor (from motor data sheet) / Moteur à facteur de surintensité de démarrage (de fiche technique du moteur) / Motore con fattore di sovracorrente (dalla scheda tecnica del motore) / Motor con factor de sobrecorrente (de la hoja de características del motor) / Кратность термической устойчивости (из технического паспорта двигателя)	$I_A/I_N = 8$
Anpassungsfaktor / Adaption factor / Facteur d'adaptation / Fattore di adeguamento / Factor de adaptació / Коэффициент адаптации	$K = 0,72$
Max. zulässiger Laststrom bei 60 °C, angereiht / Max. permissible load current at 60 °C, mounted in rows / Courant de charge maxi. à 60 °C, avec juxtaposition / Max. corrente di carico ammissibile a 60 °C (in serie) / Corriente de carga máx. admisible a 60 °C, no alineado / Макс. допустимый ток нагрузки при 60 °C, в ряд	$I_L = 2,4 A$
Max. zulässiger Bemessungsstrom / Max. permissible rated current / Courant d'emploi admissible maxi. / Max. corriente nominale ammissibile / Corriente asignada máx. admisible / Макс. допустимый расчетный ток	$I_N = 1,73 A$

EU DECLARATION OF CONFORMITY

Product designation:
MOTUS®, hybrid motor starter and accessories
Part no.: 36112 to 36114, 32109 to 36111 and their
combinations 36100 to 36108

Issued by: Wöhner GmbH & Co. KG
Mönchrödener Str. 10,
96472 Rödental, Germany

The above mentioned products conform with the basic safety requirements of the following European Regulation:

Number: 2014/30/EU
Text: Directive on electromagnetic compatibility

Number: 2014/35/EU
Text: Directive on the harmonisation of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits.

Number: 2014/34/EU
Text: Directive on the harmonisation of the laws of Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

The conformity is approved by the application of the following standards:

Harmonized European standards:
EN 60947-1:2014
EN 60947-4-2:2012
EN 61439-1:2011

Certificate of a notified body:
Address: Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100 D-38116 Braunschweig (ID no.: 0102)
Reference: PTB 13 ATEX 3001

CE marking since: 2012



**WÖHNER
TEST LABORATORY**

Philipp Steinberger
Geschäftsführer

Rödental, April 20th, 2016

Holger Schulte
Leiter Vertrieb

Please note:
This certificate refers to the production status of the mentioned products at the time of issue. It is based on a design evaluation respecting the valid standards. It is also based on our experience with similar

products. The rated values are valid for one single device in free air. In accordance with the exact application conditions, system-dependent reduction factors shall be provided. For the use of our products DIN EN 61439-1 is to be applied in the currently

valid version. Furthermore, the indications in our product manual are to be observed. A test regarding the exact conditions of use would need to be ordered specially. This certificate will not be updated after future changes in design or technology.

EU-KONFORMITÄTS- ERKLÄRUNG

Produktbezeichnung:
MOTUS®, Hybrid-Motorstarter und Zubehör
Art.-Nr. 36112 bis 36114, 32109 bis 36111 und deren
Kombinationen 36100 bis 36108

Aussteller: Wöhner GmbH & Co. KG
Mönchrödener Str. 10,
96472 Rödental, Germany

Die oben benannten Produkte stimmen mit den grundlegenden Sicherheitsanforderungen der folgenden Europäischen Richtlinie überein:

Number: 2014/30/EU
Text: Richtlinie zur Elektromagnetischen Verträglichkeit

Number: 2014/35/EU
Text: Richtlinie zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.

Number: 2014/34/EU
Text: Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsmäßigen Verwendung in explosionsgefährdeten Bereichen.

Die Übereinstimmung ist nachgewiesen durch die Anwendung folgender Normen:

Harmonisierte Europäische Normen:
EN 60947-1:2014
EN 60947-4-2:2012
EN 61439-1:2011

Zertifikat einer benannten Stelle:
Anschrift Physikalisch Technische Bundesanstalt (PTB)
Bundesallee 100, D-38116 Braunschweig (Kenn-Nr. 0102)
Referenz: PTB 13 ATEX 3001

CE-Kennzeichnung seit: 2012



**WÖHNER
TEST LABORATORY**

Philipp Steinberger
Geschäftsführer

Rödental, den 20.04. 2016

Holger Schulte
Leiter Vertrieb

Bitte beachten Sie: Diese Bestätigung bezieht sich auf den Fertigungsstand der angegebenen Produkte zum Zeitpunkt der Ausstellung. Sie basiert auf einer konstruktiven Beurteilung unter Zuhilfenahme der gültigen Standards und unserer Erfahrung mit vergleichbaren Produkten. Die

Bemessungswerte gelten jeweils für ein Einzelgerät in freier Luft. Entsprechend den konkreten Einsatzbedingungen sind anlagenspezifische Reduktionsfaktoren vorzusehen. Für die Anwendung unserer Produkte gilt die DIN EN 61439-1 in der jeweils gültigen Ausgabe. Ferner sind die

Angaben in unserem Produkthandbuch zu berücksichtigen. Eine Prüfung entsprechend konkreter Einsatzbedingungen wäre gesondert zu beauftragen. Bei künftigen konstruktiven oder technologischen Änderungen wird diese Bestätigung nicht aktualisiert.